CLAIMS

What is claimed is:

1. A method for a computer-assisted prediction of near-term development of convective meteorological events comprising the steps:

   (a) determining a difference image by advecting a first meteorological image and combining the advected first meteorological image and a second meteorological image, the first and second meteorological images each comprising data indicative of a first forecast parameter at a first time and a second time, respectively;

   (b) generating an interest image comprising a region of interest by filtering a third meteorological image; and

   (c) generating a growth image indicative of the occurrence of a convective meteorological event by combining the difference image and the interest image.

2. The method of claim **1** wherein the data of the first meteorological image comprise a two-dimensional array of pixels, each of the of pixels having a value quantifying the first forecast parameter for a predetermined geographical area.

3. The method of claim **1** wherein the first forecast parameter comprises at least one of precipitation, infrared temperature, radar reflectivity, vertically-integrated liquid (VIL), temperature stability, and albedo.

4. The method of claim **1** wherein the step of determining the difference image comprises subtracting the advected first meteorological image from the second meteorological image.

5. The method of claim **4** wherein the step of determining a difference image comprises the steps of:

determining a plurality of preliminary difference images; and

averaging the plurality of preliminary difference images to generate the difference image.

6. The method of claim **1** wherein the third meteorological image is the first meteorological image.

7. The method of claim **1** wherein the third meteorological image is indicative of a second forecast parameter.

8. The method of claim **1** wherein the step of generating the interest image comprises:

(a) filtering the third meteorological image to generate a large-scale-feature image; and

(b) filtering the third meteorological image to generate a small-scale-feature image.

9. The method of claim **7** wherein the step of filtering the large-scale-feature image comprises low-pass filtering the third meteorological image.

10. The method of claim **8** wherein the step of low-pass filtering comprises neighborhood-average filtering.

11. The method of claim **7** wherein the step of filtering the small-scale-feature image comprises high-pass filtering the third meteorological image.

12. The method of claim **10** wherein the step of high-pass filtering comprises neighborhood-standard-deviation filtering.

13. The method of claim **1** wherein the step of generating the interest image further comprises filtering the third meteorological image to generate a peakiness image indicative of convective weather.

14. The method of claim **12** wherein the step of generating the peakiness image comprises the steps:

(a) averaging the third meteorological image to generate an average meteorological image; and

(b) subtracting the average meteorological image from the third meteorological image.

15. The method of claim **1** further comprising the steps of:

(a) combining the growth image and the first meteorological image to generate a forecast image identifying the likelihood of convective meteorological events at a third time; and

(b) advecting the combined image to the third time.

16. The method of claim **1** further comprising the step of advecting the growth image with respect to time.

17. The method of claim **1** wherein the growth image comprises a decay image.

18. The method of claim **1** further comprising the step of classifying weather elements of the first meteorological image.

19. The method of claim **18** wherein the step of classifying weather elements comprises selecting weather classifications from at least one of line storm, stratiform, large cell and small cell.

20. A method for a computer-assisted prediction of near-term development of convective meteorological events comprising the steps:

(a) determining a difference image by advecting a first precipitation image, and combining the advected first precipitation image and a second precipitation

image, the first and second precipitation images indicative of precipitation at a first time and a second time, respectively;

(b) generating an interest image comprising a region of interest by filtering the second precipitation image; and

(c) generating a growth image indicative of the occurrence of a convective meteorological event by combining the difference image with the interest image.

21. The method of claim **20** wherein step (a) comprises the steps of:

determining a plurality of preliminary difference images; and

averaging the plurality of preliminary difference images to generate the difference image.

22. The method of claim **20** wherein the step of combining the advected first precipitation image and the second precipitation image comprises subtracting the manipulated first precipitation image from the second precipitation image.

23. The method of claim **20** wherein the precipitation image comprises data representative of vertically integrated liquid water content.

24. The method of claim **20** wherein the step of generating the interest image comprises:

(a) filtering the first precipitation image to generate a large-scale-feature image; and

(b) filtering the first precipitation image to generate a small-scale-feature image.

25. The method of claim **24** wherein the step of filtering the large-scale-feature image comprises low-pass filtering the first precipitation image.

26. The method of claim **24** wherein the step of filtering the small-scale-feature image comprises high-pass filtering the first precipitation image.

27. The method of claim **20** further comprising the steps of:

(a) generating a forecast image identifying the likelihood of convective meteorological events at a third time by combining the growth image and a current precipitation image; and

(b) advecting the combined image to the third time.

28. The method of claim **20** further comprising the steps:

(a) advecting a growth image according to a first advection field;

(b) advecting a current precipitation image according to a second advection field; and

(c) combining the advected growth image and advected current precipitation image to generate a forecast image.

29. The method of claim **20** wherein the growth image comprises a decay image.

30. The method of claim **20** further comprising the step of classifying weather elements of the first meteorological image.

31. A method for a computer assisted prediction of near-term development of convective meteorological events comprising the steps:

(a) determining a difference image by advecting a first infrared meteorological image and combining the advected first infrared image and a second infrared meteorological image, wherein the first and second infrared meteorological images are indicative of cloud temperature at a first time and a second time, respectively;

(b) generating an interest image comprising a region of interest by filtering a satellite visible meteorological image; and

(c) generating a growth image indicative of the occurrence of a convective meteorological event by combining the difference image and the interest image.

32. The method of claim **31** wherein step (a) further comprises the step of:

determining a plurality of preliminary difference images; and

averaging the plurality of preliminary difference images to generate the difference image.

33. The method of claim **31** wherein the step of combining the advected first infrared meteorological image and the second infrared meteorological image comprises subtracting the manipulated first infrared meteorological image from the second infrared meteorological image.

34. The method of claim **31** wherein the step of generating the interest image comprises:

(a) filtering the satellite visible meteorological image to generate a large-scale-feature image; and

(b) filtering the satellite visible meteorological image to generate a small-scale-feature image.

35. The method of claim **34** wherein the step of filtering the large-scale-feature image comprises low-pass filtering the satellite visible meteorological image.

36. The method of claim **34** wherein the step of filtering the small-scale-feature image comprises high-pass filtering the satellite visible meteorological image.

37. The method of claim **34** further comprising the step of filtering the satellite visible meteorological image to generate a peakiness image indicative of cumulus clouds.

38. The method of claim **37** wherein the step of filtering the satellite visible meteorological image comprises:

(a) averaging the visible satellite image to generate an average visible satellite meteorological image; and

(b) subtracting the average visible satellite image from the visible satellite meteorological image.

39. The method of claim **31** further comprising the steps of:

(a) generating a forecast image identifying the likelihood of convective meteorological events at a third time by combining the growth image and a current precipitation image; and

(b) advecting the combined image to the third time.

40. The method of claim **31** wherein the growth image comprises a decay image.

41. The method of claim **31** further comprising the step of classifying weather elements of the first meteorological image.

42. An apparatus for predicting near-term development of convective meteorological events comprising:

(a) means for advecting a first meteorological image and combining the advected first meteorological image and a second meteorological image to generate a difference image, the first and second meteorological images indicative of a first forecast parameter at a first time and a second time, respectively;

(b) filter means for generating an interest image comprising a region of interest by filtering a third meteorological image; and

(c) means for combining the difference image and the interest image to generate a growth image indicative of the occurrence of a convective meteorological event.

43. The apparatus of claim **42** wherein the filter means comprises:

(a) a large-scale feature detector means for filtering the third meteorological image to generate a large-scale-feature image; and

(b) a small-scale feature detector means for filtering the third meteorological image to generate a small-scale-feature image.

44. The apparatus of claim **43** wherein the large-scale feature detector comprises low-pass filter means for generating a low-pass filtered rendition of the third meteorological image.

45. The apparatus of claim **43** wherein the small-scale feature detector comprises high-pass filter means for generating a high-pass filtered rendition of the third meteorological image.

46. The apparatus of claim **42** wherein the filter means further comprises a peakiness feature-detector means for generating a peakiness image indicative of cumuliform features.

47. The apparatus of claim **42** wherein the growth image comprises a decay image.

48. The apparatus of claim **43** further comprising a means for classifying weather elements of the first meteorological image.

49. An apparatus for predicting the near-term development of convective meteorological events comprising:

an image receiver processor configured to receive a first and a second meteorological image;

a difference processor in communication with the image receiver processor, the difference processor determining a difference image in response to the first and second meteorological images;

an interest image processor in communication with the image receiver processor, the interest image processor determining an interest image in response to the first meteorological image;

a growth image processor in communication with the difference processor and the interest image processor, the growth image processor generating a growth image in response to the difference image and the interest image; and

a forecast processor in communication with the growth image processor and the image receiver processor, the forecast processor determining a short-term forecast in response to the first meteorological image and the growth image.

50. The apparatus of claim **49** wherein the interest image processor comprises:

a large-scale spatial filter; and

a small-scale spatial filter.

51. The apparatus of claim **49** wherein the forecast processor receives weather-classification information from the interest image processor and determines a short-term forecast in response to the first meteorological image, the growth image, and the weather-classification information.